Operational Safety, Suitability, and Effectiveness (OSS&E) Planning to Systems Engineering Plan (SEP) Gap Analysis

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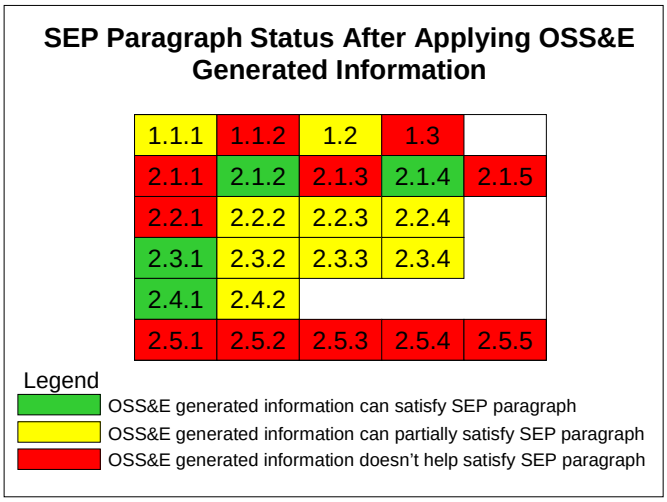
Executive Summary

The *Operational Safety, Suitability, and Effectiveness (OSS&E) Execution Plan* as a whole is not suitable to be used as a *Systems Engineering Plan* (SEP). The reason for this is the *OSS&E Execution Plan* shows how a program will develop a disciplined systems engineering process, while the SEP shows what that disciplined systems engineering process is and how it's being implemented on the program.

Though the execution plan is not suitable as a SEP, the information generated through OSS&E thinking and products captures systems engineering planning that should be incorporated into the SEP. As the figure below shows, an OSS&E Level 6 program should have enough systems engineering information to partially satisfy nine SEP paragraphs and completely satisfy four SEP paragraphs as described in the OUSD(AT&L) *Systems Engineering Plan Preparation Guide*, version 1.02.



The three-digit paragraph numbers in the above figure correspond to bulleted subparagraphs as shown in the "Suggested SEP Format" within the OUSD(AT&L) *Systems Engineering Plan Preparation Guide*.

A sustainment program can exploit the existing systems engineering planning done in support of OSS&E and fill in the gaps with other program documentation and some additional planning.

The analysis shows that the OSS&E generated information from each OSS&E level can be incorporated to meet SEP requirements, but that additional information will also be necessary. Recommendations on how to fill the OSS&E gaps for a sustainment SEP are included within the report.

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1. Introduction

Operational Safety, Suitability, and Effectiveness (OSS&E) is a process intended to assure engineering rigor and discipline is applied during weapons system sustainment, the operations and support phase of the *Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management Framework.* The *Systems Engineering Plan* (SEP) is intended to guide the systems engineering effort throughout a weapon system's life cycle and to show the Milestone Decision Authority (MDA) and Program Executive Officer (PEO) that disciplined systems engineering processes and practices are in place and used. OSS&E and the *Systems Engineering Plan* are both tools intended to invigorate systems engineering in support of safe, suitable, and effective weapon systems.

In support of the release of the new AFI 63-1201, *Systems Engineering*, SAF/AQR requested the Air Force Center for Systems Engineering at AFIT to provide "a Gap Analysis between the AFMCI 63-1201 requirements for an Operational Safety, Suitability, and Effectiveness (OSS&E) Assurance Plan and the OSD SEP Guide requirements."

This document was also written to be released at the same time and with the updated AFI 63-1201, *Systems Engineering* and the new AFMCI 63-1201. This updated AFI supersedes the older version titled *Operational Safety, Suitability, and Effectiveness*. The new AFI version doesn't eliminate OSS&E, but includes OSS&E as part of the bigger systems engineering effort.

1.1 Purpose

This report has five purposes:

a. Document how OSS&E efforts are directly related to the *Systems Engineering Plan*.
b. Show the gaps that exist between OSS&E and *Systems Engineering Plan* requirements.
c. Provide guidance on what information is needed to fill the gaps.
d. Capture the analysis that led to the gap identification and sustainment guidance.
e. Be useful for sustainment programs developing a *Systems Engineering Plan*.

1.2 Why Write a *Systems Engineering Plan*?

So, why write a *Systems Engineering Plan*? Didn't Dwight D. Eisenhower once say, "In preparing for battle I have always found that plans are useless, but planning is indispensable"? The simple truth of the matter is we write SEPs to capture the systems engineering planning we've done. The not-so-simple, not-so-hidden agenda is to allow the writing process to help guide and expand on that planning by giving us a chance to find and fill gaps in our indispensable planning.

Why do we need to capture our systems engineering planning? There are at least four very valid reasons:

a. **To remember what we decided to do.** Ever think, "Okay, what's next?" Chances are "what's next" for systems engineering was already decided on and may have even been documented somehow. At the very least your SEP should have a pointer to that documentation or, perhaps, your SEP will be that documentation.

b. **To assure continuity.** Ever think, "Well, how'd we do it last time?" For recurring activities, your SEP should point to or contain that information as well as the success or failure of "how we did it last time". There's no need to reinvent the wheel every time you need one and there's no need to reproduce a square wheel that just doesn't work – but, maybe if we chip away at the corners ... ?

c. **To train new people:** Ever think, "I wish I didn't have to explain everything to the new guy"? With a SEP you no longer have to. Be bold. Tell the new guy to set up a Test Readiness Review. The new guy should be able to go to SEP paragraph 2.4.2, *Technical Review Planning*; select the plan on accomplishing a Test Readiness Review; and begin putting one together. Of course, the new guy will still need guidance and clarification, but hey, the new guy is new.

d. **To show the high-level decision makers we know what we're doing.** Ever think, "I hope we know what we're doing"? Well, the Program Executive Officers (PEO) and Milestone Decision Authorities (MDA) are always thinking that. Your SEP is your chance to show your PEO or MDA that you know what you're doing so that the PEO or MDA can know, "We know what we're doing."

Notice there's nothing about doing business better or saving time and money in the reasons to capture our systems engineering planning. Those things are why we do the planning.

Why is it so hard to write a SEP? Could it be because technical people tend to process information visually but try to explain information in a SEP verbally? Could it be because we don't know where our planning has been captured? Could it be we try to fill in all the perceived holes to make a perfect document when reality is more than adequate? Could it be that the person writing the SEP has had no exposure to the planning? Could it be we are writing a textbook on systems engineering instead of describing how we do systems engineering? The bottom line here is a SEP documents the who, what, when, where, why, and how of your systems engineering implementation that was identified during the planning. Planning is only hard because we make it that way. Dwight D. Eisenhower alluded to this when he said, "An intellectual is a man who takes more words than necessary to tell more than he knows."

The hard part of writing a *Systems Engineering Plan* is doing the planning. Documenting the plan may be time consuming but executing the plan should be easy.

1.3 Instructions on How to Use This Document

This document is not supposed to be fancy and contains no magic for automatic SEP success. What this document contains is information you can use to see how OSS&E efforts relate to the SEP and guidance that can get you going with sustainment SEP development. The real meat of this document is contained in the appendices. So:

a. If you want to see how the OSS&E levels relate to the SEP:
Read paragraph 2.1 and look at Appendix C, *OSS&E Level to SEP Traceability Matrix*.

b. If you want to see the SEP gaps after applying OSS&E developed material:
Read paragraph 2.2, *Finding the Connections – Mapping OSS&E to the SEP*.

c. If you want to write a sustainment SEP:
Use the OUSD(AT&L) Defense Systems, *Systems Engineering Plan Preparation Guide*, version 1.02, as a guide for overall format and content.
Use paragraph 2.2, *Finding the Connections – Mapping OSS&E to the SEP*, and Appendix C, *OSS&E Level to SEP Traceability Matrix*, as a guide to help reuse information generated as part of the OSS&E effort.

d. If you want to see what material was researched in the analysis and writing of this report:
See Appendix B, *Documents Referenced and Researched*.

e. If you have questions or comments or would like clarification:
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2. Analysis and Results

2.1 Mapping Requirements - OSS&E to SEP Requirements Tracing

In the HQ AFMC/DR/EN Memo, *Execution of Air Force Polices for Assurance of Operational Safety, Suitability, and Effectiveness (OSS&E)*, 25 September 2000, six levels of OSS&E implementation are identified including the development of an *OSS&E Execution Plan* as part of level 3. The execution plan was intended for programs to show how they would get through level 6, not how programs would do OSS&E. That how to do OSS&E falls out from the thinking and products generated to meet the exit criteria for each OSS&E level. It is the information captured in the products that can be transferred to the *Systems Engineering Plan*. The OSS&E levels and a summary of each level's requirements are shown in table 1.

Table 1: Summary of OSS&E Levels and Requirements

OSS&E Level and Title	Requirements/Exit Criteria Summary
Level 1 – Chief Engineer Assigned	A person is assigned as the Chief Engineer for a specific system/end-item.
Level 2 – Configuration Control Process Established	A configuration control process is documented and actually in use. Authorities within the process are documented and assigned. Configuration control training is established.
Level 3 – Plan to Assure and Preserve OSS&E Documented	Identify how the system/end-item's program will attain OSS&E Level 6 – Full OSS&E Policy Compliance.
Level 4 – OSS&E Baselines Developed and Coordinated with User	Critical system attributes known as OSS&E Baseline Characteristics are documented and coordinated with the system/end-item user.
Level 5 – OSS&E Assessment of Fielded Systems/End-Items	Actual use and maintenance data is collected from fielded systems/end-items. The data is analyzed and compared to the OSS&E Baseline Characteristics. If disconnects exist, then either the characteristics are modified or the fielded systems/end-items are fixed.
Level 6 – Full OSS&E Policy Compliance	A disciplined systems engineering process should be in place with feedback built in to monitor OSS&E health.

Information generated in meeting each OSS&E level exit criteria can be used to partially satisfy the criteria of one or more major SEP paragraphs. Unfortunately, OSS&E generated information won't fully satisfy any of the major SEP paragraphs. The high level relationship mapping from OSS&E level

to major SEP paragraph (**as shown in the OUSD(AT&L)** ***Systems Engineering Plan Preparation Guide*****, "Suggested SEP Format"**) is shown in Figure 1. The details behind the figure are included in Appendix C, *OSS&E Level to SEP Traceability Matrix*.

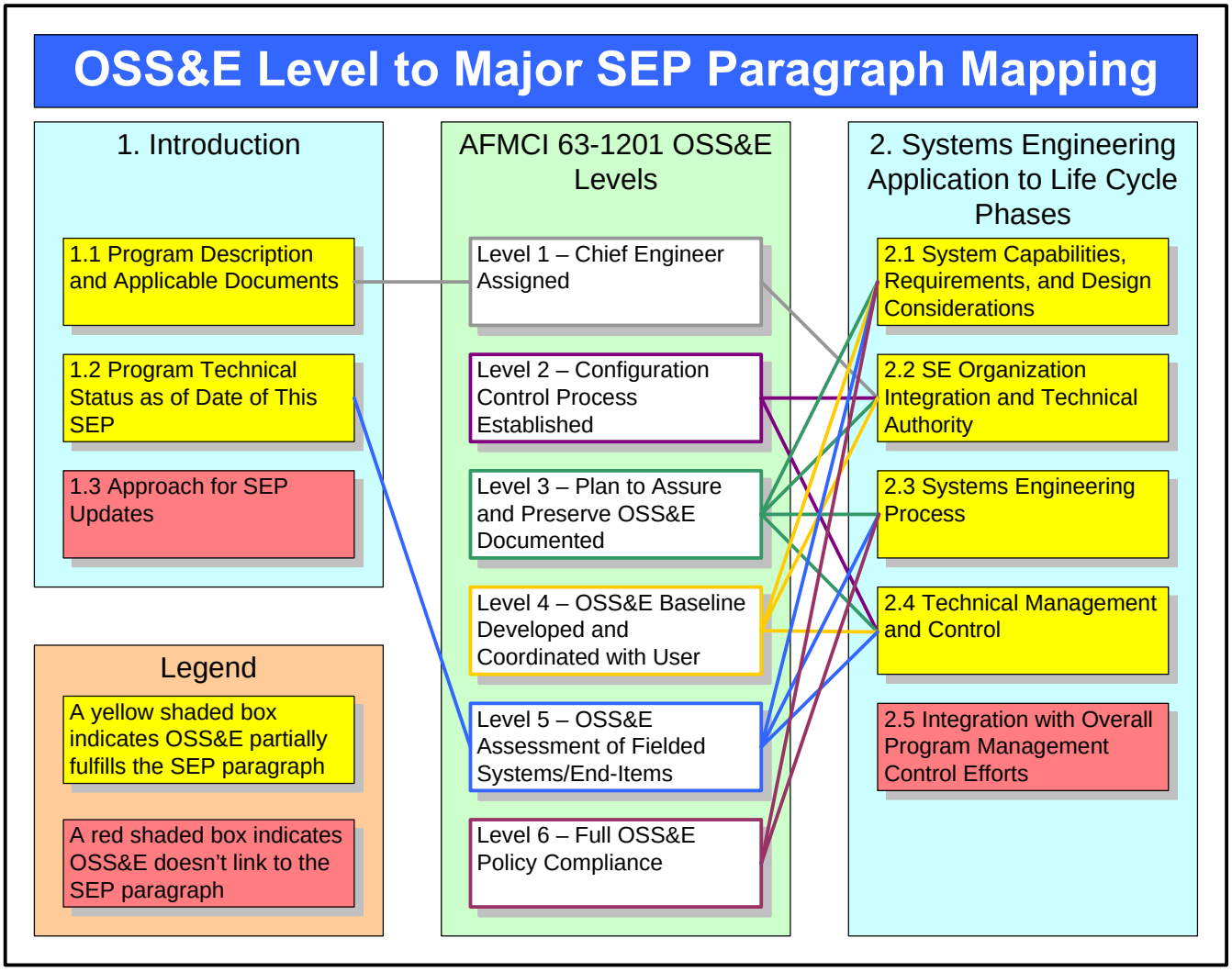

Figure 1: OSS&E Level to SEP Major Paragraph Mapping

Figure 1 shows that if a program is OSS&E level 1 or higher, it has already generated information that could be used to address the requirements of SEP paragraphs 1.1, *Program Description and Applicable Documents*, and 2.2, *SE Organizational Integration and Technical Authority*. Combine this with Appendix C, *OSS&E Level to SEP Traceability Matrix*, and you'll find the applicable information is the chief engineer's name and how the program interfaces with the System/End-Item (S&EI) List.

The requirements from each OSS&E level continue to add to the information that can carry to a SEP, but even a level 6 program hasn't generated enough information through their OSS&E efforts to completely satisfy any of the major SEP paragraphs.

2.2 Finding the Connections – Mapping OSS&E to the SEP

To figure out how information created for OSS&E implementation can be used to fulfill the requirement for a SEP, the tables in appendix C, *OSS&E Level to SEP Traceability Matrix*, were inverted. This inversion allows us to see how the OSS&E generated information applies directly to the SEP. Table 2 shows the inverted matrix with the relationship to a third SEP level. **This third SEP level corresponds to the bulleted subparagraphs as shown in the "Suggested SEP Format" within the OUSD(AT&L) *Systems Engineering Plan Preparation Guide*.**

Table 2 shows an OSS&E level 5 program has all the information needed for SEP paragraphs 2.1.2, *Key Performance Parameters*, and 2.4.1, *Technical Baseline Management and Control*. A level 6 program has the additional information needed to also meet the SEP paragraph 2.1.4, *Certification Requirements*, and 2.3.1, *Process Selection*, requirements fully. No other areas of the SEP are more than partially fulfilled through the use of OSS&E generated information. Further detail can be seen in Appendix D, *OSS&E Level to SEP Paragraph Mapping*.

2.2.1 Complete Connections

What follows is the reasoning behind the conclusion that an OSS&E Level 6 program can fully satisfy four SEP paragraphs: 2.1.2, *Key Performance Parameters*; 2.1.4, *Certification Requirements*; 2.3.1, *Process Selection*; and 2.4.1, *Technical Baseline Management and Control*. Since each program is free to implement and document OSS&E as it makes sense for the program, specific OSS&E artifacts are not mentioned. This section lists the applicable OSS&E level exit criteria for which useful artifacts should have been developed.

Table 2: SEP Status After Applying OSS&E Generated Information

SEP Paragraph Number	SEP Paragraph Title	OSS&E Level 1	OSS&E Level 2	OSS&E Level 3	OSS&E Level 4	OSS&E Level 5	OSS&E Level 6
1.	Introduction						
1.1	Program Description and Applicable Documents						
1.1.1	Program Description	Y					
1.1.2	Applicable Documents						
1.2	Program Technical Status as of Date of This SEP					Y	
1.3	Approach for SEP Updates						
2.	Systems Engineering Application to Life Cycle Phases						
2.1	System Capabilities, Requirements, and Design Considerations						
2.1.1	Capabilities to be Achieved						
2.1.2	Key Performance Parameters				Y	G	
2.1.3	Statutory and Regulatory Requirements						
2.1.4	Certification Requirements			Y			G
2.1.5	Design Considerations						
2.2	SE Organizational Integration and Technical Authority						
2.2.1	Organization of IPTs						
2.2.2	Organizational Responsibilities	Y		Y	Y		
2.2.3	Integration of SE into Program IPTs		Y	Y	Y		
2.2.4	Technical Staffing and Hiring Plan		Y				
2.3	Systems Engineering Process						
2.3.1	Process Selection						G
2.3.2	Process Improvement			Y			Y
2.3.3	Tools and Resources						Y
2.3.4	Approach for Trades					Y	Y
2.4	Technical Management and Control						
2.4.1	Technical Baseline Management and Control (Strategy and Approach)		Y			G	
2.4.2	Technical Review Plan (Strategy and Approach)			Y	Y	Y	
2.5	Integration with Overall Program Management Control Efforts						
2.5.1	Acquisition Strategy						
2.5.2	Risk Management						
2.5.3	Integrated Master Plan						
2.5.4	Earned Value Management						
2.5.5	Contract Management						

Legend		
	G	OSS&E information satisfies SEP paragraph
	Y	OSS&E information partially satisfies SEP paragraph
		OSS&E information doesn't help satisfy SEP paragraph

2.2.1.1 OSS&E Baseline Characteristic and Key Performance Parameters (KPPs)

SEP paragraph 2.1.2, *Key Performance Parameters,* can be fully satisfied using a combination of the OSS&E Level 4 exit criteria requiring the OSS&E baseline characteristics be identified and coordinated with the system/end-item user; and the OSS&E Level 5 exit criteria that fielded systems be assessed against OSS&E baseline characteristics.

The agreed to baseline characteristics should be tied to the KPPs if they exist. If KPPs don't already exist, the technical/performance baseline characteristics should be suitable to use instead of KPPs.

Consider presenting the information in a table. Table 3 provides an example.

Table 3: Sample KPP Table

KPP/Baseline Characteristic	Parameter	Threshold	Objective	Document Reference
Targeting Error	Arc distance of allowable error from targeted coordinates at a distance of 500,000 kilometers.	≤ 0.052 arc radians (3 arc degrees) using onboard visual sighting.	≤ 0.017 arc radians (1 arc degree) using onboard computing resources.	CPD Para 6.2.1
Firing Time	Elapsed time from firing order to weapon firing.	≤ 90 seconds using manual firing procedures.	≤ 15 seconds using onboard computing resources.	CPD Para 6.2.3
Net Readiness	The degree to which net-centric system activities, controls, and information exchanges will satisfy Global Information Grid (GIG) space network interfaces.	100% of the system's designated enterprise-level or critical net-centric activities, controls, and information exchanges satisfy Global Information Grid (GIG) space network interfaces or approved waivers.	100% of the system's net-centric activities, controls, and information exchanges satisfy Global Information Grid (GIG) space network interfaces or approved waivers.	CPD Para 6.3.1
Communications Interoperability	Interoperability with joint, service, and threat communication systems.	The ability to send and receive Imperial Link-86.	The ability to send and receive Republic Link-99.	CPD Para 6.3.2

2.2.1.2 Technical Baseline Management and Control

SEP paragraph 2.4.1, *Technical Baseline Management and Control*, can be fully satisfied using a combination of the OSS&E Level 2 exit criteria requiring a configuration control processes be established and documented; and the OSS&E Level 5 exit criteria that fielded system/end-item data gathered. These two exit criteria support the AFMCI 63-1201, paragraph 3.10.1, requirement that the Chief Engineer/Lead Engineer to be responsible for system or end-item configurations.

Since the configuration control process is documented, all that is needed in the SEP is a summary of the process (a nice graphic would be helpful), and a pointer to the details – including to artifacts that show you follow the process. When the process was first identified, the initial set of documents and other products that fall within the span of control may have been identified. It is this set that can

serve as the first listing of the technical baseline. Once the fielded system/end-item assessment was completed, the full set of artifacts constituting the technical baseline should have been identified. It is this full set that should be identified in the SEP.

2.2.1.3 Certifications

SEP paragraph 2.1.4, *Certification Requirements*, can be fully satisfied using a combination of the OSS&E Level 3 exit criteria requiring a plan for achieving and/or maintaining required certifications; and the OSS&E Level 6 exit criteria requiring all required certifications be in place and maintained.

When planning to achieve/maintain certifications, a list of required certifications should have been generated. This list forms the initial listing of certifications suitable to include in the SEP paragraph. Once all certifications are in place, a simple table can be used as the basis for the SEP paragraph. Table 4 provides a partial example.

Table 4: Example Certification Table

Certification	Source/Reference	Responsible Person	Completion Date(s)
DoD Information Technology Security Certification and Accreditation	DoDD 8500.1 DoDI 5200.40 DAG 7.5.10		
Electromagnetic Environmental Effects (E3) Control and Spectrum Certification	CJCSM 3170.01 CJCSI 6212.01 DAG 7.6.3.7		
Information Assurance Certification and Accreditation	DAG 7.2.3.4		
Airworthiness Certification	MIL-HDBK-516A		
Global Air Traffic Control Certification			
Joint Interoperability Certification			
National Security Agency (NSA) Cryptographic Certification			
Space Flight Worthiness			

2.2.1.4 Systems Engineering Process

SEP paragraph 2.3.1, *Process Selection*, can be fully satisfied using the OSS&E Level 6 exit criteria requiring a processes be established and in place to maintain OSS&E baseline characteristics. This

process is, in essence, the disciplined (systems) engineering process mentioned in AFMCI 63-1201, paragraph 3.10.1, for which the Chief Engineer/Lead Engineer is responsible and accountable to apply.

If your program has a well defined/documented systems engineering process, then all you have to do is explain it in paragraph 2.3.1 of a sustainment SEP. If your program doesn't have a well defined/documented systems engineering process, then you could use the *Defense Acquisition Guidebook*, chapter 4, as a guide. In either case, the material asked for in the *Defense Acquisition Guidebook*, chapter 4, should be addressed in some manner.

Figure 2 shows the high-level systems engineering process from the *Defense Acquisition Guidebook*, chapter 4, for the Operations and Support Phase. The process developed for your program need not be formatted like or look like the guidebook process, but your process activities should be able to be mapped into the guidebook process activities.

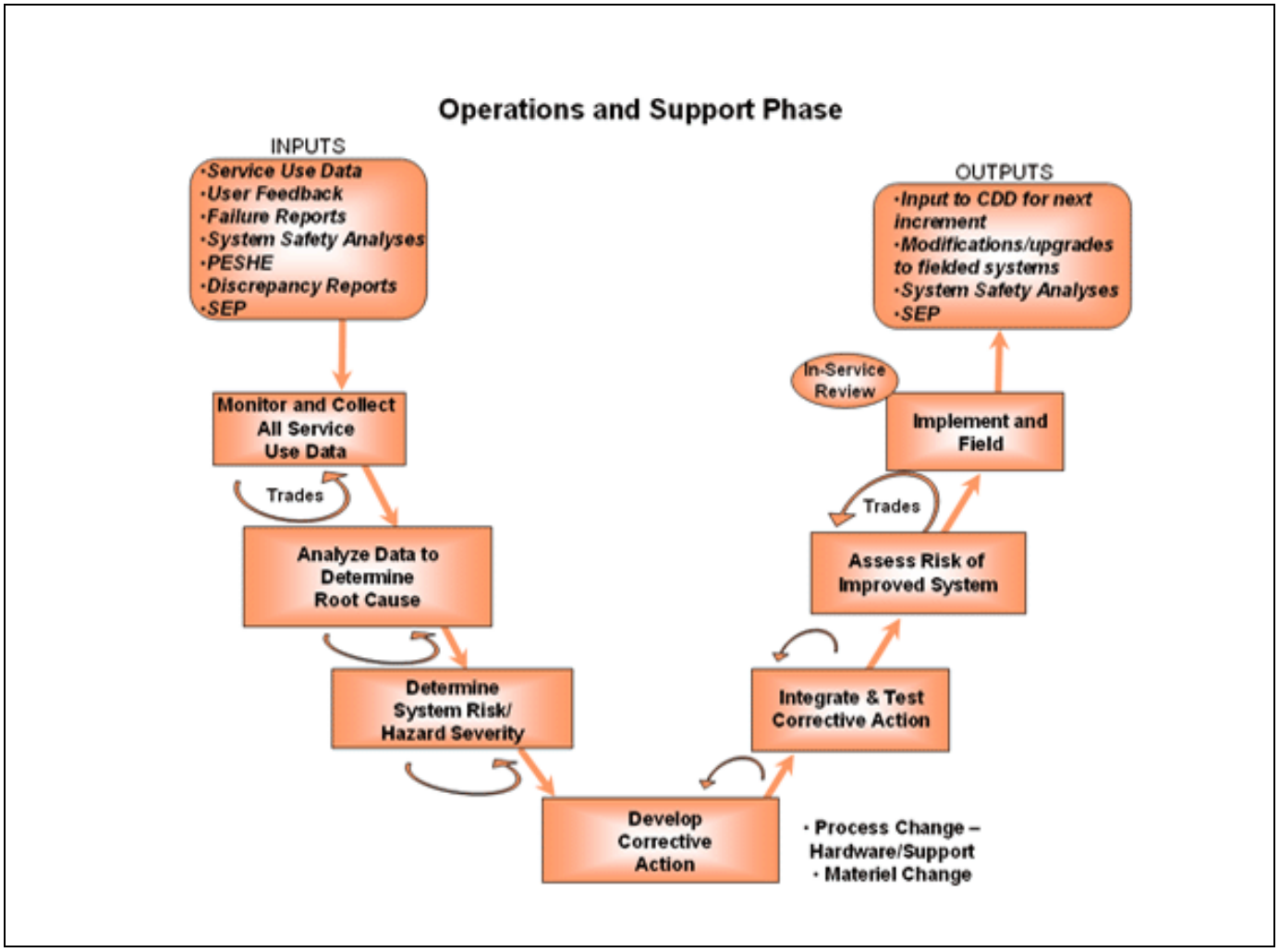

Figure 2: Systems Engineering Activities During Operations and Support

2.2.2 Partial Connections – Filling Gaps

What follows is the reasoning behind the conclusion that an OSS&E Level 6 program can partially satisfy nine SEP paragraphs: 1.1.1, *Program Description*; 1.2, *Program Technical Status*; 2.2.2, *Organizational Responsibilities*; 2.2.3, *Integration of Systems Engineering into Program IPTs*; 2.2.4, *Technical Staffing and Hiring Plan*; 2.3.2, *Process Improvement*; 2.3.3, *Tools and Resources*; 2.3.4, *Approach for Trades*; and 2.4.2, *Technical Review Plan*. Again, each program is free to implement and document OSS&E as it makes sense for the program, so specific OSS&E artifacts are not mentioned. This section cross references the applicable OSS&E level exit criteria for which useful artifacts should have been developed and the SEP paragraphs they may apply to.

2.2.2.1 Program Description

SEP paragraph 1.1.1, *Program Description*, can be partially satisfied using the OSS&E Level 1 exit criteria of having the system/end-item on the system/end-item list and having a process in place to update the list. This should provide at least a short, top-level system description of the program.

Some recommendations to help fill the gap include:

a. Expand the top-level system description to assure the overall key aspects of the program are conveyed.

b. Use a graphic or picture such as a High Level Operational Concept Graphic (DoDAF OV-1) especially if it shows any family-of-systems (FoS) and/or system-of-systems (SoS) relationships. Figure 3 provides an example.

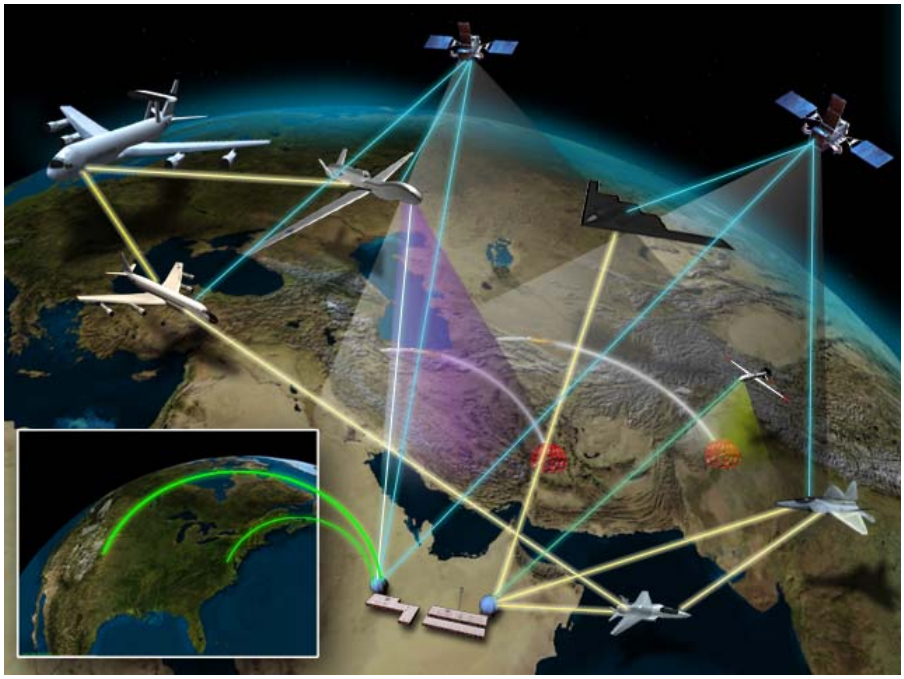

Figure 3: Example High Level Operational Concept Graphic

2.2.2.2 Technical Status

SEP paragraph 1.2, *Program Technical Status*, can be partially satisfied using the OSS&E Level 5 exit criteria of assessing fielded systems/end-items against the OSS&E baseline criteria. This should give an overall picture of system/end-item health as well as insight to the overall adequacy of the technical baseline. This information should be summarized within the paragraph.

Some recommendations to help fill the gap include:

a. Include any current/upcoming milestone information. In a sustainment SEP, you should already be passed the designated acquisition milestones, so these milestones should track to major program reviews or, perhaps, to decision points where system modification and modification approval are considered. Once a modification project is approved, that project should then create a development SEP that ties into the sustainment SEP.

b. Summary of past milestones achieved. There is no need for excruciating detail or verbosity here. The summary for each milestone should include what the stated exit conditions were and how well they were or weren't met. For each criterion not met, a short explanation should be included.

c. Identify any critical path and tracking event. This may not be applicable to a sustainment SEP, but will apply to a modification SEP.

d. Identify open hazards.

e. Summarize the status of deliverables or key events required by other programs in order to field and sustain a complete, FoS or SoS mission capability, if applicable.

f. Summarize the OSS&E effort and tie it in to the overall program and systems engineering.

2.2.2.3 Organizations

SEP paragraph 2.2.2, *Organizational Responsibilities*, can be partially satisfied using the OSS&E Level 1 exit criteria requiring a Chief Engineer be assigned, the Level 3 exit criteria requiring the OSS&E effort be planned and documented, and the Level 4 criteria requiring system/end-item user coordination. Each of these criteria requires a person or people from one or more organizations to actually do something. Much of this should already have been captured in the OSS&E Plan and should be readily transferable to the SEP.

Some recommendations to help fill the gap include:

a. Identify/list and summarize all the OSS&E MOAs/MOUs. Program offices may have MOAs/MOUs with organizations such as: the Defense Logistics Agency (DLA); AFMC logistics, test, or product centers; the Navy; the Army; operational commands; the Air Force Reserve; the Air National Guard; etc.

b. Use a graphic or picture such as an Organization Relationships Chart (DoDAF OV-4) to show organizational hierarchies and relationships.

c. Be specific as to what organization has what responsibilities. Refer to actual people and tie the organizations into the IPT structure (SEP paragraph 2.2.3, *Integration of Systems Engineering into Program IPTs*).

2.2.2.4 Integrated Product Teams (IPTs)

SEP paragraph 2.2.3, *Integration of Systems Engineering into Program IPTs*, can be partially satisfied using the OSS&E Level 2 exit criteria to identify and document delegated authority, the Level 3 exit criteria to coordinate with the OSS&E plan with the users, and the Level 4 exit criteria to coordinate the OSS&E baseline characteristics and metrics with the users. In each of these cases, a group of people should have been identified to accept delegated authority and to handle the coordination. Those people delegated authority may be the equivalent of IPT leads and those handling the coordination may represent an IPT. These things already taken care of through OSS&E can form the basis to start satisfying this SEP paragraph.

Some recommendations to help fill the gap include:

a. Graphically show the program's IPT structure in SEP paragraph 2.2.1, *Organization of IPTs*. Include references to the Work Breakdown Structure (WBS) elements and the specifications each individual IPT oversees. Figure 4 provides an example.

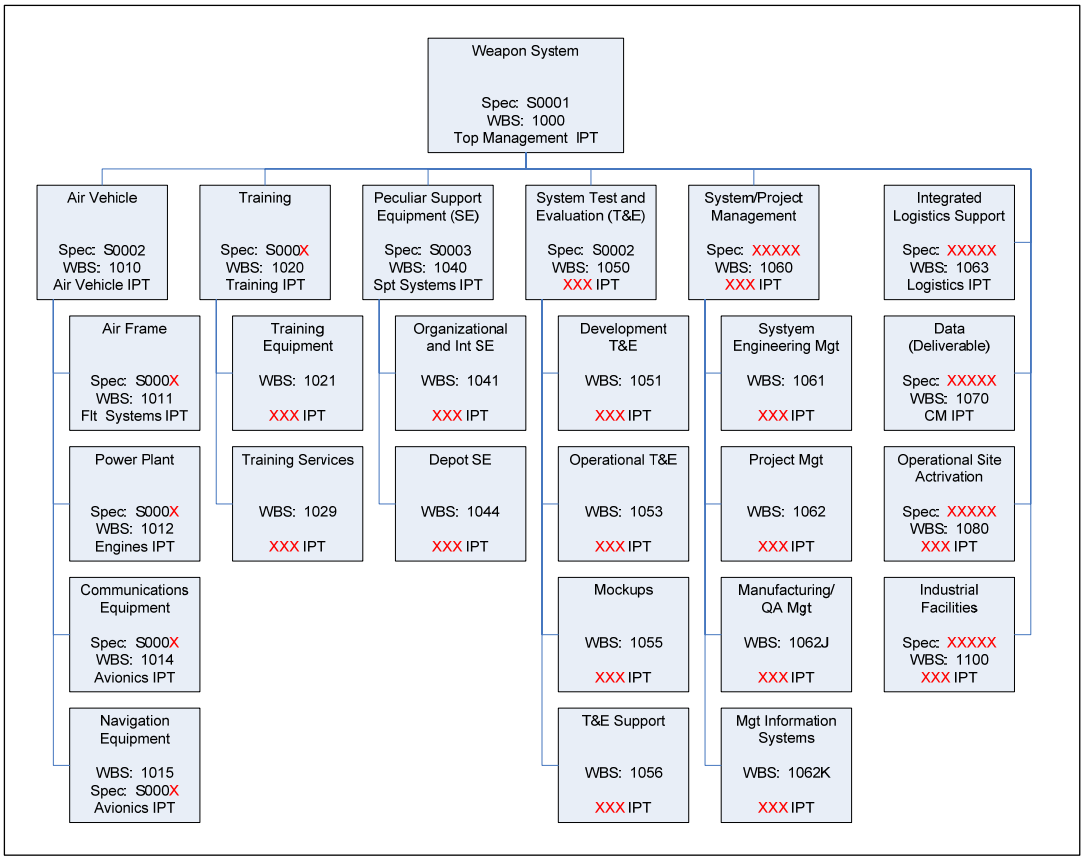

Figure 4: Example IPT Chart Incorporating WBS and Specification Tree Information

b. Identify/highlight any IPT that has a systems engineering presence and explain the systems engineering roles and responsibilities within those IPTs.

c. If systems engineering is a separate IPT, explain how that IPT is integrated with other IPTs to show how systems engineering works with and influences the other IPTs to assure a disciplined systems engineering process is followed.

2.2.2.5 Staffing

SEP paragraph 2.2.4, *Technical Staffing and Hiring Plan*, can be partially satisfied using the OSS&E Level 2 exit criteria to identify configuration control process training requirements. This information can be included in the staffing and hiring plan as required training for all new engineers and project managers upon being hired.

Some recommendations to help fill the gap include:

a. Identify key positions within the systems engineering organization and provide the required/desired experience, skills, and knowledge need to perform within those positions. Include possible training opportunities to upgrade individuals who don't meet all the qualifications.

b. Identify general engineering and staff positions and provide the required/desired experience, skills, and knowledge need to perform within those positions. Include possible training opportunities to upgrade individuals who don't meet all the qualifications.

c. Provide a comparison between what a fully staffed systems engineering function would look like against what really exists. If gaps in the systems engineering organization exist, explain how full staffing will be attained, why full staffing will not be attained, or why full staffing is not needed.

d. Provide a reference/link to any center-level or general staffing plan that may have relevant information.

2.2.2.6 Systems Engineering Process Improvement

SEP paragraph 2.3.2, *Process Improvement*, can be partially satisfied using the OSS&E Level 3 exit criteria to plan for data system feedback mechanisms and Level 6 exit criteria to have established feedback mechanisms to monitor OSS&E health. The results of the feedback data analysis may be useful in assessing the effectiveness of the systems engineering process and identifying potential process improvements. If this is done, it should be explained within this SEP paragraph.

Some recommendations to help fill the gap include:

a. Explain how process effectiveness is measured/evaluated and who is responsible for improving the process.

b. Include a summary of any Air Force Smart Operations 21 (AFSO21) initiatives both being implemented and being planned.

c. Identify who has the authority to approve process changes and how those changes are managed and controlled.

2.2.2.7 Tools and Resources

SEP paragraph 2.3.3, *Tools and Resources*, can be partially satisfied using the OSS&E Level 6 exit criteria to have established feedback mechanisms to monitor OSS&E health. What tools are used to get and analyze the feedback should form the beginning of a tools list.

Some recommendations to help fill the gap include:

a. Identify and list the tools used to automate the systems engineering process, to manage requirements and system configuration, to develop and sustain software and hardware, to test and evaluate system performance, to budget for future systems engineering efforts, and to provide training. Some examples/ideas are included in Table 5.

Table 5: Example Tools/Resources Listing

Tool/Resource	Purpose	Owner	Users
Integrated Digital Environment			
Information Resource Management			
Dynamic Object-Oriented Requirements System (DOORS)			
Electronic Change Request System			
Digital Image Management System			
Engineering Source Data Requirements			
Data Library			
Manufacturing Resource Planning and Shop Floor Control			
Integrated Master Plan			
Integrated Master Schedule			
Risk Management Board			
Earned Value Management System			
Health Visibility Management System			

b. Relate the purpose of each tool back to one or more systems engineering activities to show how the tool supports the program's systems engineering effort.

2.2.2.8 Trade Analysis

SEP paragraph 2.3.4, *Approach for Trades*, can be partially satisfied using the OSS&E Level 5 exit criteria to identify OSS&E baseline characteristics disconnects and recommend corrective actions and the Level 6 criteria to monitor OSS&E health. In these cases, decisions have already had to be made and alternatives have been evaluated. You can get a good start on this SEP paragraph by identifying the types of decisions made, who made them, and how they were made. If the trade analysis process was effective, why not continue to use it?

During sustainment, trade analysis/studies may lead to system modifications.

Some recommendations to help fill the gap include:

a. Describe any analysis/studies planned for making trades among: stated requirements; design; project schedule; functional and performance requirements; function; task; and decision allocation among human, software, and hardware and life cycle and design to cost.

b. Describe the trade analysis/study process and methods to be used.

c. Include the intended measures of effectiveness (MOE) and how they interrelate.

d. Include criteria for the selection of measures of performance (MOP) to support the evolving definition and verification of the system including how they support the MOEs.

e. Include how the analytical results are integrated and the criteria used; rationale for the solution; evaluation of ESOR hazards, mitigation and/or associated formal risk acceptance; and how performance requirements, life cycle costs, etc, will be considered.

f. Summarize recent trade analysis/studies and how they have steered the technical and programmatic changes to the program.

2.2.2.9 Technical Reviews

SEP paragraph 2.4.2, *Technical Review Plan*, can be partially satisfied using the OSS&E Level 3 exit criteria to establish metrics; the Level 4 exit criteria to measure safety, suitability, and effectiveness; and the Level 5 exit criteria to recommend corrective actions to users. For each of these criteria to be met, some sort of technical interchange had to take place. The interchanges may not have been identified as formally recognized acquisition related technical reviews, but technical reviews they were. By documenting how they occurred, who participated, and what the results were, you'll have a good start to the intent of this SEP paragraph.

Some recommendations to help fill the gap include:

a. Don't worry about minimizing future technical reviews, just identify and plan those reviews that the program needs. Seasoned travelers know that shortcuts frequently take more time and are more expensive than the beaten path.

b. Emphasize that your technical reviews are event driven. Show that the program knows a predetermined date is not an event in and of itself.

c. Use table 6, *Generic Technical Review Template*, as a template. The amount of information included in table 6 may appear overwhelming because there's a lot of it. Just take a look at the template and use it as something to help you consider your options. The technical reviews are yours and should reflect and meet the needs of the program.

Table 6: Generic Technical Review Template

Review Name	*What is the name of this review?*			
Purpose	*Why are we having this review?* *Statements like, "Because it's required", are not good purposes.*			
Participants	*-- All participants should be identified by name, functional title, and office --*			
Chair	*This can be someone from within the program, but could also be the Independent Subject Matter Expert (SME).*			
Independent SME	*This is someone from outside the program.*			
Stakeholders	*User/Operator*	*Safety*	*Logistics*	*Depot*
	Requirements Generators	*Training*	*Maintenance*	*Manpower*
	Human Systems	*Vehicles*	*Power Generation*	*Fuels*
	Program Manager/Director	*Suppliers*	*Contractor*	*Subcontractor*
	Systems Engineering	*DCMA*	*Contracting*	
	System Sustainment Manager		*Other guests*	
Entrance Criteria/ Event Timing	*What other program activities must be completed before calling this review?* *What technical efforts/documents/drawings/funding are required to accomplish this review?* *What is the needed maturity of the documents/drawings (threshold/objective)?* *Who has the decision authority/responsibility to call this review?*			
Review Conduct	*What are the ground rules?* *Who has final say on dispute resolution?* *What are the roles and responsibilities of the participants?* *Where will the review be held?* *Who is the host?* *Who will take minutes? Publish minutes? Approve minutes?* *What is the planned agenda?* *How will everyone know when the review is completed?* *What will happen if the review can't be completed successfully?*			
Success Criteria/ Key Metrics	*What is the measurable definition of success (threshold/objective)?* *What is the political definition of success? Is it compatible with the above?* *What agreements must be made and/or consensus reached?* *Who can declare success?*			
Technical Maturity Assessment	*How will the information considered during the review be used to assess the program's technical maturity?* *What part of the technical baseline is being assessed?*			

2.2.3 No Connections – Filling More Gaps

2.2.3.1 References

To satisfy SEP paragraph 1.1.2, *Applicable Documents*, consider the following:

a. Identify reference documents and a point of contact for each document. Consider using a simple table. Table 7 provides an example:

Table 7: SAMPLE Document Listing

Document Title	Document OPR (Name and Office)	Document Date
Analysis of Alternatives – Space Based Stand-off Attack Capability	CAPT Grant M. Piece US Space Defense Command/J6D	23 Sep 10
Capability Development Document (CDD) – SAMPLE System		18 Sep 13
Concept of Operations – Space Based Stand-off Attack Capability		07 Nov 09
Enabling Concept – SAMPLE System		18 Oct 10
Initial Capabilities Document (ICD) – SAMPLE System		21 Jan 11
SAMPLE Acquisition Strategy		16 Nov 10
SAMPLE Integrated Master Plan (IMP)		12 Sep 13
SAMPLE Integrated Master Schedule (IMS)		12 Sep 13
SAMPLE Integrated Risk Management Plan		12 Sep 13
SAMPLE System Program Management Plan		12 Sep 13
SAMPLE Work Breakdown Structure (WBS)		12 Sep 13

b. Summarize important program documents and reference (provide links) to the sections and pages of documents that contain the detailed information.

c. Provide the hierarchy of these documents. Consider doing this graphically.

2.2.3.2 SEP Updates

To satisfy SEP paragraph 1.3, *Approach for SEP Updates*, consider the following:

a. Identify the events that trigger SEP updates and the sources of those updates. Consider using a table as shown in table 8.

b. List previous SEP submittals by date as part of a change log table.

Table 8: Example SEP Update Trigger Table

SEP Update Triggers	Update Source(s)
Annual Systems Engineering Review	Program Chief Engineer (government) Program Chief Engineer (contractor)
Initiation of a Modification Project	Program Chief Engineer (government) Program Chief Engineer (contractor)
Milestone Decision Point	Milestone Decision Authority Center Chief Engineer Program Chief Engineer (government) Program Chief Engineer (contractor)
Decommissioning Decision	Program Chief Engineer (government) Program Chief Engineer (contractor)

2.2.3.3 Capabilities

To satisfy SEP paragraph 2.1.1, *Capabilities to be Achieved*, consider the following:

a. Rename this paragraph to *Capabilities to Sustain*. This should be a mission level introduction to SEP paragraph 2.1.2, *Key Performance Parameters*.

b. Summarize the required capability to sustain. This should be found in the Capability Production Document (CPD), if one exists.

c. Summarize the approved operational concept.

d. Reference/link to the appropriate documents.

2.2.3.4 Legal Requirements

To satisfy SEP paragraph 2.1.3, *Statutory and Regulatory Requirements*, consider the following:

a. Use the DoD Instruction 5000.2 Information Requirements associated with Operations and Support as summarized in the *Defense Acquisition Guidebook* as a starting point if other program documents don't already summarize the legal requirements.

b. Consult with legal acquisition counsel.

c. Describe the plan for achieving those requirements, including the applicable approving authority.

d. Explain any MDA tailoring of regulatory program information.

e. Use tables to present the statutes and regulations. Tables 9 and 10 provide examples.

Table 9: Example Statute References

Statute	Purpose/Information Required	Responsible Person	Completion Date(s)
Public Law 107-248, Sec. 8088(a) [an appropriations act]	Registration of mission-critical and mission-essential information systems		
Public Law 106-398, Section 811, Acquisition and Management of Information Technology	Registration of mission-critical and mission-essential information systems		
10 USC 2432, Selected Acquisition Reports	Selected Acquisition Reports		
10 USC 2433, Unit Cost Report	Unit Cost Report		
Public Law 103-160, Sec. 220 as amended by Public Law 103-337, Sec. 214**,** Electronic Warfare (EW) T&E	EW programs on OSD T&E Oversight List		
10 USC 2435	Program Deviation Report		
10 USC 2399	Operational Test Plan		

Table 10: Example Regulatory References

Regulation	Information Required	Responsible Person	Completion Date(s)
DoD Instruction 5000.2	Component Cost Analysis		
	Cost Analysis Requirements Description		
	Component Live-Fire Test and Evaluation Report		
	Defense Acquisition Executive Summary		
OMB Circular A-11, Part 7	Earned Value Management Systems		
Federal Aviation Regulation Part 25	In-flight icing characteristics		

2.2.3.5 Design Considerations

To satisfy SEP paragraph 2.1.5, *Design Considerations*, consider the following:

a. Rename this paragraph to *Design Considerations to Sustain.*

b. Identify the design constraints that would apply to any future modification effort.

2.2.3.6 Integrated Product Teams (IPTs)

To satisfy SEP paragraph 2.2.1, *Organization of IPTs*, consider the following:

a. Graphically show the program's IPT structure. Include references to the Work Breakdown Structure (WBS) elements and the specifications each individual IPT oversees. Figure 5 provides a sample.

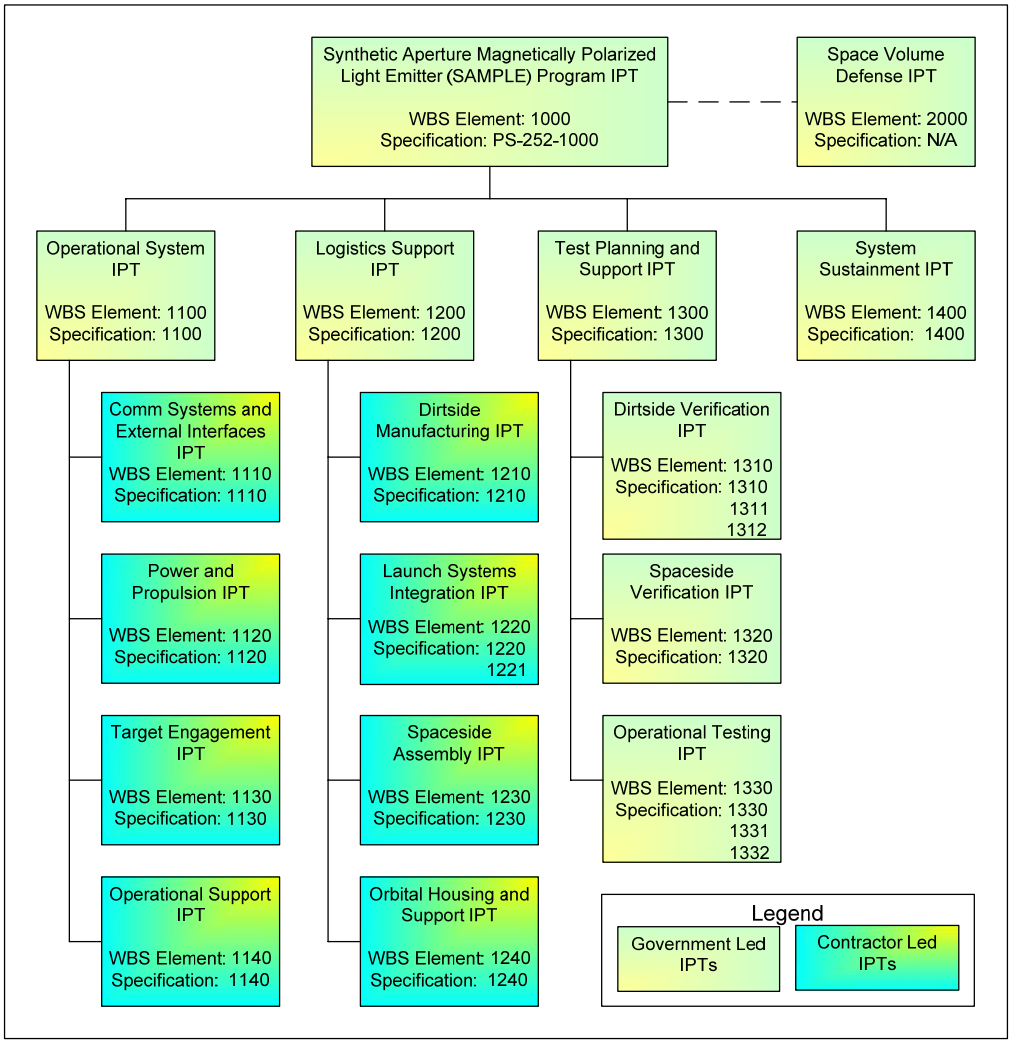

Figure 5: SAMPLE IPT Chart with WBS and Specification Reference Information

b. If you are having trouble finding a documented IPT structure, take a look at the program telephone/contact sheet. Many times these are arranged in a manner that reflects the way things actually get done.

2.2.3.7 Strategy

To satisfy SEP paragraph 2.5.1, *Acquisition Strategy*, consider the following:

a. Rename this paragraph to *Sustainment Strategy*.

b. Explain how the program's selected sustainment strategy is based on the technical understanding of the system/end-item.

c. Address potential modifications and the strategies that might be used to acquire them. In a modification SEP, this paragraph would return to *Acquisition Strategy*.

2.2.3.8 Risk

To satisfy SEP paragraph 2.5.2, *Risk Management*, consider the following:

a. Show the linkages between the technical risk assessment and mitigation efforts and the overall risk management process. Reference/link to the program *Risk Management Plan*.

b. Show/describe sample risks. Table 11 provides a format example.

Table 11: Example Risk Exposure Table

Risk – Explanation	Current Assessment	Affect on Planning Efforts
On Orbit Attack Exposure – multiple governments and terrorist organizations have a capability to attack orbital targets	Green	Both government and contractor systems engineers modified technical and engineering plans to reflect a change in assembly orbit. Launch plans and payload manifests were changed.
Launch Vehicle Shortage – multiple launches per day for many consecutive days will be needed. This exceeds current inventory capability.	Yellow	Contractor systems engineers have planned flexible payload configurations to take advantage of every booster type used by the USAF, NASA, and European Space Agency (ESA).
Amorphous Silicon (Solar Cell) Shortage – silicon foundry capability is increasing, but not yet sufficient to meet projected program solar cell needs.	Yellow	Contractor engineering plans include options to increase on orbit, fuel cell capabilities to support low power, environmental applications.

c. Show how systems engineering participates in risk management. Provide an example of risk identification, assessment, and mitigation to show you can do risk management.

2.2.3.9 Integrated Master Plan

To satisfy SEP paragraph 2.5.3, *Integrated Master Plan*, consider the following:

a. Show how the technical activities are integrated into the overall program management effort through the Program Management Plan (PMP) or Integrated Master Plan (IMP) and Integrated Master Schedule (IMS).

b. Explain how systems engineering influences the PMP or IMP and IMS.

2.2.3.10 Earned Value

To satisfy SEP paragraph 2.5.4, *Earned Value Management*, consider the following:

a. Consider changing the paragraph name to *Value Management*.

b. Explain how value is applied to sustainment efforts earned. An Earned Value Management System (EVMS) may already be applied to a sustainment contract, but an explanation of how value is earned from the organic (government) effort is determined and used should be included.

c. Describe the technical efforts that are included in measuring earned value and how earned value is mapped to the technical reviews.

2.2.3.11 Contracts

To satisfy SEP paragraph 2.5.5, *Contract Management*, consider the following:

a. Describe how the contract, subcontract, and supplier, if applicable, technical efforts are managed.

b. Describe how sources are selected.

c. Describe the approach for contractor award fees and performance incentives and what are the specific incentives for systems engineering.

d. Describe the contracting strategies for incentivizing contractors to design for optimum materiel readiness at minimum life-cycle cost (e.g., design for reliability and maintainability, or design for corrosion resistance).

e. Use the *DoD Guide for Contracting for Systems Engineering* as a guide when it becomes available.

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Appendix A: Abbreviations

AFI	Air Force Instruction
AFIT	Air Force Institute of Technology
AFMC	Air Force Material Command
AFMCI	Air Force Material Command Instruction
AFPD	Air Force Policy Directive
AFSO21	Air Force Smart Operations 21
AT&L	Acquisition, Technology, and Logistics
CCA	Clinger Cohen Act
CJCSI	Chairman Joint Chiefs of Staff Instruction
CJCSM	Chairman Joint Chiefs of Staff Manual
CPD	Capabilities Production Document
CSE	Air Force Center for Systems Engineering at AFIT
CTP	Critical Technical Parameter
DAG	Defense Acquisition Guidebook
DCMA	Defense Contract Management Agency
DoDAF	Department of Defense Architecture Framework
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
EW	Electronic Warfare
EVMS	Earned Value Management System
FoS	Family of Systems
HQ	Headquarters
IMP	Integrated Master Plan
IMS	Integrated Master Schedule
INCOSE	International Council on Systems Engineering
IPT	Integrated Product Team
KPP	Key Performance Parameter
MAIS	Major Automated Information Systems
MDA	Milestone Decision Authority
MDAP	Major Defense Acquisition Program
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding

NSA	National Security Agency
OPR	Office of Primary Responsibility
OSS&E	Operational Safety, Suitability, and Effectiveness
OUSD	Office of the Undersecretary of Defense
OV-1	Operational View 1: DoDAF High Level Operational Concept Graphic
OV-4	Operational View 4: DoDAF Organization Relationships Chart
PEO	Program Executive Officer
PMP	Program Management Plan
S&EI	System/End Item
SAF	Secretary of the Air Force
SAMPLE	Synthetic Aperture Magnetically Polarized light Emitter
SE	Systems Engineering
SEP	Systems Engineering Plan
SME	Subject Matter Expert
SoS	System of Systems
T&E	Test and Evaluation
WBS	Work Breakdown Structure

Appendix B: Documents Referenced and Researched

[1] HQ AFMC/DR/EN Memo, *Execution of Air Force Polices for Assurance of Operational Safety, Suitability, and Effectiveness (OSS&E)*, 25 September 2000

[2] HQ AFMC/EN, AFMCI 63-1201, *Assurance of Operational Safety, Suitability, and Effectiveness*, 05 April 2000

[3] OUSD(AT&L) Defense Systems, *Systems Engineering Plan Preparation Guide*, version 1.02, 10 February 2006
http://www.acq.osd.mil/se/publications/pig/sep_prepguide_v1_2.pdf

[4] SAF/AQX, AFI 63-1101, *Modification Management*, 17 July 2001
http://www.e-publishing.af.mil/pubfiles/af/63/afi63-1101/afi63-1101.pdf

[5] SAF/AQR. AFPD 63-12, *Assurance of Operational Safety, Suitability, and Effectiveness*, 01 February 2000
http://www.e-publishing.af.mil/pubfiles/af/63/afpd63-12/afpd63-12.pdf

[6] SAF/AQR. AFI 63-1201, *Assurance of Operational Safety, Suitability, and Effectiveness*, 01 February 2000 [Wholly incorporated in the updated AFI 63-1201, *Systems Engineering*, release date: on or about 1 October 2006]
http://www.e-publishing.af.mil/pubfiles/af/63/afi63-1201/afi63-1201.pdf

[7] SAF/AQR, E-mail, *CSE Sustainment SEP Guidance Task Request*, 21 July 2006

[8] OUSD(AT&L), *Defense Acquisition Guidebook*, chapter 4
http://akss.dau.mil/dag/DoD5000.asp?view=document

[9] OUSD(AT&L), *Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management Framework*, version 5.2, August 2005
http://www.dau.mil/pubs/IDA/IDA_04.aspx

[10] Dennis M. Buede, *The Engineering Design of Systems*, 2000, Wiley Interscience Publication

[11] Charles S. Wasson, *System Analysis, Design, and Development*, 2006, Wiley Interscience Publication

[12] International Council on Systems Engineering (INCOSE), *Systems Engineering Handbook, A Guide for System Life Cycle Processes and Activities*, June 2006, INCOSE

[13] DoD Architecture Framework Working Group, *DoD Architecture Framework, Volume II: Product Descriptions*, version 1, 09 February 2004.
http://www.dod.mil/nii/doc/DoDAF_v1_Volume_II.pdf

[14] OUSD(AT&L) DS/SE/ED, *DoD Guide for Contracting for Systems Engineering*, October 2006 anticipated release
http://www.acq.osd.mil/se/ed/publications.htm

Appendix C: OSS&E Level to SEP Traceability Matrix

This appendix breaks out the exit criteria from each of the six levels of OSS&E implementation as defined in the HQ AFMC/DR/EN Memo, *Execution of Air Force Polices for Assurance of Operational Safety, Suitability, and Effectiveness (OSS&E)*, 25 September 2000. It also maps that breakout to SEP paragraphs where the information needed to meet the criteria could be reused.

C1 OSS&E Level 1 to SEP Traceability

Table C1: OSS&E Level 1 Exit Criteria to SEP Tracing

Designated OSS&E Level Reference OSS&E Execution Memo (24 Sep 00)	SEP Preparation Guide, ver 1.02 Reference	SEP Paragraph Reference and Comments
Level 1 - Chief Engineer Assigned		
1.1 - System/End-Item (S&EI) on OSS&E S&EI List	3.3.1	1.1.1 Program Description: Provide the top level System/End-Item description and any family-of-systems (FoS) or system-of-systems (SoS) relationships.
1.2 - Chief Engineer identified on OSS&E S&EI list	3.3.1 3.4.2	1.1.1 Program Description: Include a paragraph referencing the S&EI list. 2.2.2 Organizational Responsibilities: Identify the chief engineer, by name, as the chief technical authority within the program organization.
1.3 - Process is in place to update S&EI list	3.3.1	1.1.1 Program Description: Include a paragraph explaining this process and who has responsibilities to assure the S&EI listing is current.

C2 OSS&E Level 2 to SEP Traceability

Table C2: OSS&E Level 2 Exit Criteria to SEP Tracing

Designated OSS&E Level Reference OSS&E Execution Memo (24 Sep 00)	SEP Preparation Guide, ver 1.02 Reference	SEP Paragraph Reference and Comments
Level 2 - Configuration Control Processes Established		
2.1 - Configuration control processes identified and documented at the program level	3.4.4	2.4.1 Technical Baseline Management and Control Strategy: Summarize the process, identify the role of the technical authority, identify what products are managed, and reference the configuration control process document(s).
2.2 - Configuration control process training requirements identified	3.4.2	2.2.4 Technical Staff and Hiring Plan: Include within the subsection describing "the staffing levels, training, and experience needed to execute the required technical effort".
2.3 - Configuration control processes in-place and operating	3.4.4	2.4.1 Technical Baseline Management and Control Strategy: Identify (list?) what products are managed. Summarize the process and reference the document that describes/establishes the process.
2.4 - Delegated authority identified and documented	3.4.2 3.4.4	2.2.3 Integration of SE into Program IPTs: Show program IPT structure and where/how systems engineering fits in. Identify who participates and what their role/authority is. 2.4.1 Technical Baseline Management and Control Strategy: Identify at what level the products are managed and who. This can be tied back in to the IPT structure.

C3 OSS&E Level 3 to SEP Traceability

Table C3: OSS&E Level 3 Exit Criteria to SEP Tracing

Designated OSS&E Level Reference OSS&E Execution Memo (24 Sep 00)	SEP Preparation Guide, ver 1.02 Reference	SEP Paragraph Reference and Comments
Level 3 - Plan to Assure and Preserve OSS&E Documented		
3.1 - Plan shall include strategies/approach for:		
3.1.1 - Identifying, reconciling, and preserving OSS&E baseline characteristics	3.4.4	2.4.2 Technical Review Plan (Strategy and Approach): Explain who, how, and when (specifying event triggers).
3.1.2 - Achieving and/or maintaining required certifications	3.4.1	2.1.4 Certification Requirements: Identify the certifications the system needs, who is responsible to assure the certification is accomplished/current, and when the certification is do/was accomplished.
3.1.3 - Establishing OSS&E program level and product line metrics	3.4.4	2.4.2 Technical Review Plan: OSS&E program level and product line metrics may be applicable as Critical Technical Parameters (CTPs) and should be tied to the OSS&E Baseline Characteristics.
3.1.4 - Identifying data system feedback mechanisms	3.4.3 3.4.4	2.3.2 Process Improvement: Identify what feedback systems/data you're using and how the information is used to adjust your systems engineering effort. There may be event triggers identified that set off an update to the SEP. 2.4.2 Technical Review Plan (Strategy and Approach): Explain how technical reviews are used to assess both system and process maturity.

Table C3: OSS&E Level 3 Exit Criteria to SEP Tracing (continued)

Designated OSS&E Level Reference OSS&E Execution Memo (24 Sep 00)	SEP Preparation Guide, ver 1.02 Reference	SEP Paragraph Reference and Comments
3.2 - OSS&E Execution Plan coordinated with:		
3.2.1 - Users	3.4.2	2.2.2 Organizational Responsibilities: What user organizations are involved, who represents them, what are their roles, and what are their responsibilities. Reference any MOA/MOU with user organizations. 2.2.3 Integration of SE into Program IPTs: For each IPT, show how the users fit in and how they relate to systems engineering.
3.2.2 - Appropriate Product, Logistic, Test and Specialty Centers	3.4.2	2.2.2 Organizational Responsibilities: What center (AFMC or other) organizations are involved, who represents them, what are their roles, and what are their responsibilities. Reference any MOA/MOU with these organizations. 2.2.3 Integration of SE into Program IPTs: For each IPT, show how the each of the centers fit in and how that relates to systems engineering.

C4 OSS&E Level 4 to SEP Traceability

Table C4: OSS&E Level 4 Exit Criteria to SEP Tracing

Designated OSS&E Level Reference OSS&E Execution Memo (24 Sep 00)	SEP Preparation Guide, ver 1.02 Reference	SEP Paragraph Reference and Comments
Level 4 - OSS&E Baselines Developed and Coordinated with User		
4.1 - OSS&E baseline characteristics identified	3.4.1	2.1.2 Key Performance Parameters: If formal KPPs haven't been identified, state so and use the OSS&E baseline characteristics. If KPPs have been identified, then show how the OSS&E baseline characteristics support the KPPs.
4.2 - Critical characteristics for measuring safety, suitability, and effectiveness selected	3.4.4	2.4.2 Technical Review Plan: These can be used as Critical Technical Parameters (CTPs) and should be tied to the OSS&E Baseline Characteristics.
4.3 - OSS&E baseline characteristics and metrics coordinated with users	3.4.2	2.2.2 Organizational Responsibilities: Include the organization responsible to initiate coordination as well as the organizations coordinating on the OSS&E baseline characteristics. 2.2.3 Integration of SE into Program IPTs: Identify any IPT that is responsible for baseline characteristic oversight, review, coordination, or approval.

C5 OSS&E Level 5 to SEP Traceability

Table C5: OSS&E Level 5 Exit Criteria to SEP Tracing

Designated OSS&E Level Reference OSS&E Execution Memo (24 Sep 00)	SEP Preparation Guide, ver 1.02 Reference	SEP Paragraph Reference and Comments
Level 5 - OSS&E Assessment of Fielded Systems/End-Items		
5.1 - Fielded system/end-item data gathered	3.3.2	1.2 Program Technical Status as of Date of This SEP: Identify the latest status of the Fielded system/end-item.
	3.4.4	2.4.1 Technical Baseline Management and Control (Strategy and Approach): Explain how field data is assessed and used within the configuration control process.
5.2 - OSS&E baseline characteristics assessment completed	3.3.2	1.2 Program Technical Status as of Date of This SEP: Identify the latest status of the baseline characteristics.
	3.4.1	2.1.2 Key Performance Parameters: Assessment may result in changes to those identified at level 4. If formal KPPs haven't been identified, state so and use the OSS&E baseline characteristics. If KPPs have been identified, then show how the OSS&E baseline characteristics support the KPPs.

Table C5: OSS&E Level 5 Exit Criteria to SEP Tracing (continued)

Designated OSS&E Level Reference OSS&E Execution Memo (24 Sep 00)	SEP Preparation Guide, ver 1.02 Reference	SEP Paragraph Reference and Comments
5.3 - OSS&E baseline disconnects identified	3.3.2	1.2 Program Technical Status as of Date of This SEP: Identify the latest status of the baseline characteristics.
	3.4.3	2.3.4 Approaches for Trades: How are the disconnects used to help decide what is important when determining sustainment efforts.
	3.4.4	2.4.2 Technical Review Plan (Strategy and Approach): Describe any technical review(s) used to assess the baseline characteristics and/or disconnects.
5.4 - Recommended corrective actions to users	3.4.3	2.3.4 Approaches for Trades: How are the recommended corrective actions used to help decide what is important when determining sustainment efforts.
	3.4.4	2.4.2 Technical Review Plan (Strategy and Approach):

C6 OSS&E Level 6 to SEP Traceability

Table C6: OSS&E Level 6 Exit Criteria to SEP Tracing

Designated OSS&E Level Reference OSS&E Execution Memo (24 Sep 00)	SEP Preparation Guide, ver 1.02 Reference	SEP Paragraph Reference and Comments
Level 6 - Full OSS&E Policy Compliance		
6.1 - All required certifications in place and maintained	3.4.1	2.1.4 Certification Requirements: This should result in a direct listing of certification requirements without having to invent any additional information. Identify the certifications the system needs, who is responsible to assure the certification is accomplished/current, and when the certification is do/was accomplished.
6.2 - Metrics and feedback systems monitoring OSS&E health	3.4.3	2.3.3 Tools and Resources: List the tools and other resources being used, who is responsible for them, the purpose for each tool/resource, and what each one is for (how is it used). 2.3.4 Approaches for Trades: How is the feedback information incorporated with deciding what is important when determining sustainment efforts.
6.3 - Processes established and in place to maintain OSS&E baseline characteristics	3.4.3	2.3.1 Process Selection: Describe the process that is already established, reference documents that contain the detail, and delineate who is responsible for what, when. 2.3.2 Process Improvement: Describe how process improvement initiatives are part of the process, how process improvement is accomplished, and who has what authority/responsibility.

Appendix D: OSS&E Level to SEP Paragraph Mapping

This appendix provides a quick reference to show in which SEP paragraphs information generated in support of exit OSS&E level exit criteria can be reused. Table D shows the high level mapping and includes only those SEP paragraphs affected. Any SEP paragraph not referenced is not a candidate for OSS&E information reuse.

Table D: Overall Mapping of OSS&E Level Requirements to Applicable SEP Paragraphs

SEP Paragraph Number	SEP Paragraph Title	OSS&E Level 1	OSS&E Level 2	OSS&E Level 3	OSS&E Level 4	OSS&E Level 5	OSS&E Level 6
1.	Introduction						
1.1	Program Description and Applicable Documents						
1.1.1	Program Description	Y					
1.2	Program Technical Status as of Date of This SEP					Y	
2.	Systems Engineering Application to Life Cycle Phases						
2.1	System Capabilities, Requirements, and Design Considerations						
2.1.2	Key Performance Parameters				Y	G	
2.1.4	Certification Requirements			Y			G
2.2	SE Organizational Integration and Technical Authority						
2.2.2	Organizational Responsibilities	Y		Y	Y		
2.2.3	Integration of SE into Program IPTs		Y	Y	Y		
2.2.4	Technical Staffing and Hiring Plan		Y				
2.3	Systems Engineering Process						
2.3.1	Process Selection			Y			G
2.3.2	Process Improvement			Y			Y
2.3.3	Tools and Resources						Y
2.3.4	Approach for Trades					Y	Y
2.4	Technical Management and Control						
2.4.1	Technical Baseline Management and Control (Strategy and Approach)		Y			G	
2.4.2	Technical Review Plan (Strategy and Approach)			Y	Y	Y	

Legend
G OSS&E information satisfies SEP paragraph
Y OSS&E information partially satisfies SEP paragraph

D1. OSS&E Level 1 Reference to SEP Paragraph Mapping

Table D1 shows the detailed OSS&E Level 1 exit criteria mapping to the affected SEP paragraphs. The OSS&E Level 1 and its exit criteria references are:

Level 1 - Chief Engineer Assigned
- 1.1 - System/End-Item (S&EI) on OSS&E S&EI List
- 1.2 - Chief Engineer identified on OSS&E S&EI list
- 1.3 - Process is in place to update S&EI list

Table D1: Detailed Mapping of OSS&E Level 1 Exit Criteria to Applicable SEP Paragraphs

SEP Paragraph Number	SEP Paragraph Title	Level 1 Ref 1.1	Level 1 Ref 1.2	Level 1 Ref 1.3
1.	Introduction			
1.1	Program Description and Applicable Documents			
1.1.1	Program Description	Y	Y	Y
2.	Systems Engineering Application to Life Cycle Phases			
2.2	SE Organizational Integration and Technical Authority			
2.2.2	Organizational Responsibilities		Y	

Legend
G OSS&E information satisfies SEP paragraph
Y OSS&E information partially satisfies SEP paragraph

D2. OSS&E Level 2 Reference to SEP Paragraph Mapping

Table D2 shows the detailed OSS&E Level 2 exit criteria mapping to the affected SEP paragraphs. The OSS&E Level 2 and its exit criteria references are:

Level 2 - Configuration Control Processes Established
- 2.1 - Configuration control processes identified and documented at the program level
- 2.2 - Configuration control process training requirements identified
- 2.3 - Configuration control processes in-place and operating
- 2.4 - Delegated authority identified and documented

Table D2: Detailed Mapping of OSS&E Level 2 Exit Criteria to Applicable SEP Paragraphs

SEP Paragraph Number	SEP Paragraph Title	Level 2 Ref 2.1	Level 2 Ref 2.2	Level 2 Ref 2.3	Level 2 Ref 2.4
2.	Systems Engineering Application to Life Cycle Phases				
2.2	SE Organizational Integration and Technical Authority				
2.2.3	Integration of SE into Program IPTs				Y
2.2.4	Technical Staffing and Hiring Plan		Y		
2.4	Technical Management and Control				
2.4.1	Technical Baseline Management and Control (Strategy and Approach)	Y		Y	Y

Legend
G — OSS&E information satisfies SEP paragraph
Y — OSS&E information partially satisfies SEP paragraph

D3. OSS&E Level 3 Reference to SEP Paragraph Mapping

Table D3 shows the detailed OSS&E Level 3 exit criteria mapping to the affected SEP paragraphs. The OSS&E Level 3 and its exit criteria references are:

Level 3 - Plan to Assure and Preserve OSS&E Documented
- 3.1 - Plan shall include strategies/approach for:
  - 3.1.1 - Identifying, reconciling, and preserving OSS&E baseline characteristics
  - 3.1.2 - Achieving and/or maintaining required certifications
  - 3.1.3 - Establishing OSS&E program level and product line metrics
  - 3.1.4 - Identifying data system feedback mechanisms
- 3.2 - OSS&E Execution Plan coordinated with:
  - 3.2.1 - Users
  - 3.2.2 - Appropriate Product, Logistic, Test and Specialty Centers

Table D3: Detailed Mapping of OSS&E Level 3 Exit Criteria to Applicable SEP Paragraphs

SEP Paragraph Number	SEP Paragraph Title	Level 3 Ref 3.1.1	Level 3 Ref 3.1.2	Level 3 Ref 3.1.3	Level 3 Ref 3.1.4	Level 3 Ref 3.2.1	Level 3 Ref 3.2.2
2.	Systems Engineering Application to Life Cycle Phases						
2.1	System Capabilities, Requirements, and Design Considerations						
2.1.4	Certification Requirements		Y				
2.2	SE Organizational Integration and Technical Authority						
2.2.2	Organizational Responsibilities					Y	Y
2.2.3	Integration of SE into Program IPTs					Y	Y
2.3	Systems Engineering Process						
2.3.2	Process Improvement				Y		
2.4	Technical Management and Control						
2.4.2	Technical Review Plan (Strategy and Approach)	Y		Y	Y		

Legend
G — OSS&E information satisfies SEP paragraph
Y — OSS&E information partially satisfies SEP paragraph

D4. OSS&E Level 4 Reference to SEP Paragraph Mapping

Table D4 shows the detailed OSS&E Level 4 exit criteria mapping to the affected SEP paragraphs. The OSS&E Level 4 and its exit criteria references are:

Level 4 - OSS&E Baselines Developed and Coordinated with User
- 4.1 - OSS&E baseline characteristics identified
- 4.2 - Critical characteristics for measuring safety, suitability, and effectiveness selected
- 4.3 - OSS&E baseline characteristics and metrics coordinated with users

Table D4: Detailed Mapping of OSS&E Level 4 Exit Criteria to Applicable SEP Paragraphs

SEP Paragraph Number	SEP Paragraph Title	Level 4 Ref 4.1	Level 4 Ref 4.2	Level 4 Ref 4.3
2.	Systems Engineering Application to Life Cycle Phases			
2.1	System Capabilities, Requirements, and Design Considerations			
2.1.2	Key Performance Parameters	Y		
2.2	SE Organizational Integration and Technical Authority			
2.2.2	Organizational Responsibilities			Y
2.2.3	Integration of SE into Program IPTs			Y
2.4	Technical Management and Control			
2.4.2	Technical Review Plan (Strategy and Approach)		Y	

Legend
- G — OSS&E information satisfies SEP paragraph
- Y — OSS&E information partially satisfies SEP paragraph

D5. OSS&E Level 5 Reference to SEP Paragraph Mapping

Table D5 shows the detailed OSS&E Level 5 exit criteria mapping to the affected SEP paragraphs. The OSS&E Level 5 and its exit criteria references are:

Level 5 - OSS&E Assessment of Fielded Systems/End-Items
- 5.1 - Fielded system/end-item data gathered
- 5.2 - OSS&E baseline characteristics assessment completed
- 5.3 - OSS&E baseline disconnects identified
- 5.4 - Recommended corrective actions to users

Table D5: Detailed Mapping of OSS&E Level 5 Exit Criteria to Applicable SEP Paragraphs

SEP Paragraph Number	SEP Paragraph Title	Level 5 Ref 5.1	Level 5 Ref 5.2	Level 5 Ref 5.3	Level 5 Ref 5.4
1.	Introduction				
1.2	Program Technical Status as of Date of This SEP	Y	Y	Y	
2.	Systems Engineering Application to Life Cycle Phases				
2.1	System Capabilities, Requirements, and Design Considerations				
2.1.2	Key Performance Parameters		G		
2.3	Systems Engineering Process				
2.3.4	Approach for Trades			Y	Y
2.4	Technical Management and Control				
2.4.1	Technical Baseline Management and Control (Strategy and Approach)	G			
2.4.2	Technical Review Plan (Strategy and Approach)			Y	Y

Legend
G OSS&E information satisfies SEP paragraph
Y OSS&E information partially satisfies SEP paragraph

D6. OSS&E Level 6 Reference to SEP Paragraph Mapping

Table D6 shows the detailed OSS&E Level 6 exit criteria mapping to the affected SEP paragraphs. The OSS&E Level 6 and its exit criteria references are:

Level 6 - Full OSS&E Policy Compliance
- 6.1 - All required certifications in place and maintained
- 6.2 - Metrics and feedback systems monitoring OSS&E health
- 6.3 - Processes established and in place to maintain OSS&E baseline characteristics

Table D6: Detailed Mapping of OSS&E Level 6 Exit Criteria to Applicable SEP Paragraphs

SEP Paragraph Number	SEP Paragraph Title	Level 6 Ref 6.1	Level 6 Ref 6.2	Level 6 Ref 6.3
2.	Systems Engineering Application to Life Cycle Phases			
2.1	System Capabilities, Requirements, and Design Considerations			
2.1.4	Certification Requirements	G		
2.3	Systems Engineering Process			
2.3.1	Process Selection			G
2.3.2	Process Improvement			Y
2.3.3	Tools and Resources		Y	
2.3.4	Approach for Trades		Y	

Legend
G OSS&E information satisfies SEP paragraph
Y OSS&E information partially satisfies SEP paragraph